

The Bede Academy – Integrated CCTV & IP-Surveillance with Access Control and beyond

Winner Security Excellence Awards 2009 - Best Integrated System

Section 1

Challenge

The challenge was to build a safe and secure environment for a new and very large academy school covering two sites in Blyth, Northumberland, some 15 miles north east of Newcastle Upon Tyne. The system needed to deliver a high level of security, whilst minimising the manpower required to monitor and keep it running. As such it needed to maximise operator efficiency, provide complete accountability in case of incidents and deliver clear return on investment over time.

A challenge that was specific to the Academy was the need to make both sites highly secure, whilst remaining totally open. There was no question of fencing in either of the sites. Visitors are able to walk directly in off the street to the main reception areas and, with proper access, move around inside the buildings. The fact that the Academy will contain a large amount of Information and Communication Technology (ICT) equipment including hundreds of laptops, interactive whiteboards, projectors, digital displays and IP phones will naturally make it a target for thieves.

The Bede Academy replaces two secondary schools and one primary school in an area that has suffered in the wake of the collapse of the coal mining industry which it relied on for employment up until the mid-1980s.

All education establishments present specific challenges from a security perspective and The Bede Academy is no different. During the day security incidents revolve around inappropriate behaviour of pupils: bullying, petty theft and vandalism for example. At night and during the long holidays the threats can be more serious - extending to arson, theft and criminal damage.

The 20 years of experience that 2020 Vision Technology has gathered whilst building security systems for well known education establishments such as University of Newcastle Upon Tyne, University of Northumberland, Durham University, Birmingham University and most recently The Excelsior Academy in Newcastle Upon Tyne, have helped inform this highly successful implementation of a state-of-the-art, fully integrated IP-Surveillance and IP Access Control system at The Bede Academy.

Peter Houlis, managing director, 2020 Vision Technology, said:

“Our experience tells us that integrating a number of security systems is a one plus one equals three equation. In other words the whole integrated solution is greater than the sum of its parts. Where systems have not been integrated, security gaps naturally emerge which make the site a little more vulnerable and increase the workload on security and facilities management teams. True integration delivers return on investment very rapidly because it reduces the manpower required for comprehensive

monitoring considerably because human intervention is only required for the few exceptions (alerts) that the system generates.”

The Bede Academy, like most schools, has limited security and facilities management resources so any system needs to be intelligent, taking the hard work out of monitoring both sites day and night. It needs to enable security guards and facilities managers to react effectively to genuine alerts rather than running around after false alarms or conducting lengthy and fruitless investigations. It also needs to be low maintenance so that extensions, upgrades and software patches can be handled by in-house IT departments if at all possible.

The Academy's secondary level school site, called Bede North, covers 12,500 square metres and when fully completed will hold 1,150 pupils aged 11 to 18 years old. The 4,000 square metre primary level site called Bede South will hold 640 pupils aged 3 to 10 years old. When the school is opened in September 2009 these sites will initially hold 740 and 550 pupils respectively, making The Bede Academy one of the largest of the new academy schools championed by Tony Blair's administration over the last 10 years. The total cost of building works across both sites was £36.5 million.

Solution

2020 Vision Technology was commissioned by the primary electrical contractor Veale Nixon and worked alongside electrical design consultants Cundal to build a fully integrated IP-based access control and surveillance system.

2020 Vision specified and integrated a total of 192 network cameras and 13 analogue-based CCTV cameras across both sites. Unusually this included fitting of a camera in every classroom throughout the secondary school site at Bede North. These were installed mainly for the protection of teachers who, in some schools in recent years, have been subject to allegations by pupils that, if proved, might easily have led to teacher suspensions and low staff morale. Experience gained in the use of network cameras in classrooms at The Excelsior Academy in Newcastle Upon Tyne, where 2020 Vision installed a fully integrated access control and surveillance system in 2007, proved that having cameras inside the classroom acted as an effective deterrent against vandalism, bullying, inappropriate teacher-pupil interaction and other disruptive behaviour.

A total of 138 AXIS 216FD (Fixed Dome) Network Cameras and six AXIS 225FDs have been installed in classrooms, corridors and common areas of both sites. Where network cameras cover corridors and stairwells over a distance of more than 10 metres but less than 20 metres, 2020 Vision selected a total 28 Arecont Vision AV1300 1.3 Megapixel IP-cameras. Where reach needed to be 20 metres or more 11 Arecont Vision AV3100 3 Megapixel IP-Cameras have been deployed.

Arecont Vision's megapixel cameras enable very high quality images to be captured which clearly identify individuals involved over large distances which otherwise would demand deployment of several standard fixed dome cameras. Eleven 360 Vision 'Vision Dome' PTZ CCTV Dome Cameras and two further static analogue cameras were located externally in external housings. The Vision Domes were generally mounted up high masts. All external CCTV cameras are powered via 230 volts mains electricity. All internal cameras are connected to a Gigabit Ethernet network and powered via Power over Ethernet (PoE) over CAT 6 cabling which runs throughout both Bede North and Bede South sites. All PoE cameras are supported by central Uninterruptible Power Supplies (UPSs) which ensure that power cuts will not affect the IP-Surveillance or access control systems. All internal network cameras are also specified for H.264 compression to help reduce bandwidth consumption.

Eighteen Redwall Passive Infrared Detectors (PIRs), capable of picking up motion in all lighting conditions up to 100 metres away with a three metre wide beam, have been installed on the masts or on external walls to trigger external cameras into higher frame rates once motion is detected.

Section 2

Central recording and control systems from Instek Digital

All network and analogue-based CCTV camera images are connected to a total of seven Instek Digital MatriVideo NVRs (HR-NR 3400-3U & 2Y Series) and MatriVideo DVRs (HR-DR 3600-3U Series), distributed in secure locations around the building and controlled from a high security IT control room. Instek Digital's recording solution offers a totally dedicated hardware and firmware solution which involves no other hardware providers. Video streams pass back from Instek Digital recorders to two Instek Command Center Management Systems, one at each site. The Instek Command Centers are effectively the central control point for each site. As such they are permanently manned by a facilities manager during the day and a security guard throughout the night.

The Instek Command Center offers a three screen display located at the main reception desk. The central screen displays an interactive map of the whole site which shows where each camera is located. It is possible to click on specific camera icons and automatically bring up live images from that camera on the right-hand monitor. Recorded images, from before an incident for example, can be simultaneously displayed on the left hand monitor. It is possible to drag and drop specific video streams onto a single split screen display for deeper analysis of live and recorded images simultaneously.

The Instek Command Center can in fact display concurrent 20 live and/or recorded video streams with screen partitions (1, 4, 9, 16), execute camera tours, view alarm instances and control PTZ cameras, all at the same time. Instant playback function provides security professionals with an easy tool to review movement that just happened by simply clicking the button on the central display panel. All these functions are carried out by its user-friendly Graphical User Interface. With three display monitors located next to each other, the security operator has a comprehensive view of the areas under surveillance as well as control of the devices within the associated views.

Each terminal has its specific function; one for multiple videos display, the second for live video or playback and the third for alarm operation and site map navigation. Command Center provides the most intelligent and comprehensive video search tool. Its graphical display presents an instant glance of the recorded video history. The Advanced Smart Search function provides the latest intelligent video analytics technology on recorded video including advanced motion detection, intrusion detection, object left/ removal detection, crowd density management and scene change detection.

The Instek Digital video management, recording and display solution has been widely acclaimed following its deployment by 2020 Vision at the Excelsior Academy in Newcastle. It is highly regarded by security guards and facilities managers who use it to assess alerts thrown up by the system before determining whether additional support or investigation is required.

Tight integration with Cardax IP-based access control breaks new ground

Tight software-level integration between Instek's solution and one Cardax FT Command Centre (Version 5.21) located at each site, together with a total of 41 Cardax FT Controller 3000 door controllers, deployed alongside Mifare smart card machines, has generated significant benefits for the security and facilities managers at the North and South Bede sites. This pure IP access control system is now able to

deliver messages from the Cardax FT door controllers at network speeds, with no relays or analogue to IP messaging delays, directly to Instek's Command Center within milliseconds.

This integration means that Bede Academy has been able to realise its vision of creating an open, yet highly secure school. Cameras monitor doors, stairwells and corridors at up to three frames per second during periods when pupils are in classes and there is likely to be little movement in common areas. But if doors are forced open or smart card readers generate a read error this automatically triggers relevant cameras either side of the door into collecting images at 12 frames per second.

The facilities manager or security guard will simultaneously get the alert and be able to locate the door concerned via the interactive map at the Command Center, whereupon he/she will be able to click on and view the high resolution, high frame rate live views, alongside images from several minutes leading up to the time of the alert. The integration also extends to fire doors which send alerts and relevant images if these are breached.

So far teachers have been issued with smart cards whilst during break times doors will be released to allow free flow of pupils in and out and around the academy. The intention is to issue smart cards to all pupils as their key form of identification.

The Instek Digital system potentially offers the option of integrating with intruder detection, fire detection and alarm systems, as well as building management systems as these systems move onto the network.

The Cardax access control system is already capable of delivering alerts in the form of SMS (text) messages to mobile devices if security guards are patrolling but to date this functionality has not been deployed at The Bede Academy.

All images are retained for 30 days. Incidents which are under investigation are archived onto DVD or separately filed on the Instek NVR or DVR for further analysis once they have been checked for admissibility in a court of law.

Benefits

Academy schools have suffered in terms of security in recent years because they are often created through the amalgamation of three or four failing or below-standard schools in tough areas and problems can occur when the trouble-makers and bullies in these separate schools are brought together under one roof.

At The Excelsior Academy, 2020 Vision installed a security system which proved a highly successful deterrent to a previously predictable cycle of vandalism, bullying and pupil-teacher abuse which had marred some academies' first few months. The surveillance system there enabled this cycle to be broken. Lessons learnt at this site were fed into the creation of this state-of-the-art IP-based system at The Bede Academy, which optimises the use of tight integration between the latest IP-based access control and surveillance systems.

Tight integration between IP-based access control and the Instek Digital video management and control systems, combined with 2020 Vision's exemplary installation and configuration, makes The Bede Academy a breakthrough case study for IP-based and hybrid security systems alike. 2020 Vision's innovative installation shows that it's possible to combine CCTV and network cameras images with IP-based access control and intelligent recording and management to create a solution which is comprehensive, discreet and future proof.

Security guards that have used the system have been impressed by its ease-of-use and Instek Digital offers a powerful platform for centrally managing other alarm-based building management systems including intrusion, fire and smoke detection.

Power over Ethernet has reduced initial electrical installation costs by as much as £80 per camera or £15,360 at this site. Other operating cost savings have been achieved through reducing demand on the network through use of H.264 compression for all network cameras and putting system maintenance and upgrading work in the hands of the in-house IT department. The use of megapixel cameras in some of the larger common areas has reduced the number of cameras that were needed for this install.

The Bede Academy, as the fourth Emmanuel School Foundation school in the UK, places a major emphasis on the important Christian values of effective discipline and good behaviour which is definitely supported and backed up by this security system. It is these values, combined with the new 'high tech' facilities at the Bede Academy, which explains why pupil places there are so over-subscribed.